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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,538	03/24/2004	Arak Sutivong	030226	6148

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QUALCOMM INCORPORATED
5775 MOREHOUSE DR.
SAN DIEGO, CA 92121

EXAMINER	
PATEL, CHANDRAHAS B	

ART UNIT	PAPER NUMBER
2616	

NOTIFICATION DATE	DELIVERY MODE
08/12/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

us-docketing@qualcomm.com
kascanla@qualcomm.com
nanm@qualcomm.com

Office Action Summary	Application No.	Applicant(s)
	10/809,538	SUTIVONG ET AL.
	Examiner	Art Unit
	Chandrahas Patel	2616

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 17 June 2008.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1 and 3-27 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1, 3-27 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 6/17/2008 have been fully considered but they are not persuasive.

Applicant argues that Narasimhan does not teach averaging the received power with at least one previously stored received power measurement for the unassigned sub-carrier frequency band. However, examiner disagrees. Narasimhan teaches at Col. 8, lines 17-47 averaging the power over the number of OFDM symbols and measuring signal quality and performing SNR estimate on a per symbol basis. These symbols are previously stored since otherwise averaging SNR would not be possible. Narsimhan teaches estimating can be done over a number of received OFDM symbols which would have to be stored in order to do calculations using those symbols.

Applicant argues that Narsimhan does not teach averaging the received power with at least one previously stored received power measurement to produce a noise estimate corresponding to the unassigned sub-carrier frequency band. However, examiner disagrees. Equation 9 teaches averaging the received power with previously stored symbols to produce noise estimates as described in Col. 8, lines 17-47.

Claim Rejections - 35 USC § 102

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1, 3-8, 12-27 are under 35 U.S.C. 102(e) as being anticipated by Narasimhan (USPN 7,016,651).

Regarding claim 1, Narasimhan teaches a method of estimating noise in an Orthogonal Frequency Division Multiplexing (OFDM) system **[Abstract]**, the method comprising: receiving OFDM symbols **[Abstract]**; and detecting a received power of a signal in an unassigned sub-carrier frequency band **[Abstract, determining SNR determines power of unassigned sub-carrier]**; and averaging the received power with at least one previously stored received power measurement for the unassigned sub-carrier frequency band **[Col. 8, lines 17-47, averaging the power over the number of OFDM symbols and measuring signal quality and performing SNR estimate and averaging on a per symbol basis]**.

Regarding claim 3, Narasimhan teaches prior to detecting the received power, demodulating an unassigned sub-carrier corresponding to the unassigned sub-carrier frequency band **[Fig. 2, 220 is before 235, also see Col. 5, lines 61-67 – Col. 6, lines 1-8]**.

Regarding claim 4, Narasimhan teaches determining the unassigned sub-carrier frequency band based in part on a received message **[Col. 12, lines 20-26, where selecting one of the subsets will leave the other subset unassigned]**.

Regarding claim 5, Narasimhan teaches the unassigned sub-carrier frequency band based in part on an internally generated sequence **[Col. 12, lines 20-26, selection is done after FFT recovers the symbols]**.

Regarding claim 6, Narasimhan teaches wirelessly receiving, from a base station transmitter, RF OFDM symbols **[Fig. 1, Col. 3, lines 19-23]**.

Regarding claim 7, Narasimhan teaches converting wirelessly received RF OFDM symbols to baseband OFDM symbols **[Fig. 1, 120]**; removing a guard interval from the baseband

OFDM symbols **[Col. 3, lines 35-40]**; and transforming, using a Fast Fourier Transform (FFT), time domain OFDM baseband signals to modulated sub-carriers **[Fig. 2, 208]**.

Regarding claims 8, 20, 26, Narasimhan teaches determining **one of a** magnitude, amplitude, or **a squared magnitude** of the signal in the unassigned OFDM frequency band **[Col. 8, lines 57-64]**.

Regarding claim 12, Narasimhan teaches averaging the received power with at least one previously stored received power measurement to produce a noise estimate corresponding to the unassigned sub-carrier frequency band **[Fig. 4, 410-420, Col. 10, lines 19-31]**; and communicating the noise estimate to a transmitter **[Fig. 4, 435, 440]**.

Regarding claim 13, Narasimhan teaches transmitting the noise estimate from a terminal transmitter to a base transceiver station **[Fig. 1, noise estimation is done in 120 which is then passed to 135, Col. 3, lines 40-48]**.

Regarding claim 14, Narasimhan teaches a method of estimating noise in an Orthogonal Frequency Division Multiplexing (OFDM) system **[Abstract]**, the method comprising: receiving OFDM symbols in a wireless cellular communication system, the OFDM symbols corresponding to a symbol period **[Abstract]**; determining an unassigned sub-carrier during the symbol period **[Col. 12, lines 20-26, where selecting one of the subsets will leave the other subset unassigned]**; determining a power, during the symbol period, of a signal in a frequency band corresponding to the unassigned sub-carrier **[Abstract, determining SNR determines power of unassigned sub-carrier]**; storing a value of the power of the signal in a memory; and averaging the power of the signal with previously stored values to generate a noise estimate **[Col. 8, lines**

17-47, averaging the power over the number of OFDM symbols and measuring signal quality and performing SNR estimate and averaging on a per symbol basis].

Regarding claim 15, Narasimhan teaches an apparatus for estimating noise in an Orthogonal Frequency Division Multiplexing (OFDM) system **[Fig. 2]**, the apparatus comprising: a wireless receiver configured to wirelessly receive OFDM symbols corresponding to an OFDM symbol period **[Fig. 1 and 2, 120]**; a detector configured to detect a received power level of signals received by the wireless receiver during the OFDM symbol period **[Fig. 2, 210, 235]**; a processor coupled to the detector and configured to determine an unassigned sub-carrier during the OFDM symbol period and determine a noise estimate based in part on a received power level in a frequency band corresponding to the unassigned sub-carrier **[Fig. 4, 415, Col. 3, lines 31-48, determining SNR determines power of unassigned sub-carrier]**, and to determine an average noise estimate based in part on the noise estimate and a previously stored noised estimate **[Col. 8, lines 17-47, averaging the power over the number of OFDM symbols and measuring signal quality and performing SNR estimate and averaging on a per symbol basis]**.

Regarding claims 16 and 22, Narasimhan teaches the apparatus comprising memory coupled to the processor to store the noise estimates in the memory **[Fig. 4, 420 step shows comparing SQ which is noise estimate from step 415 so the apparatus has to have memory coupled to processor, also see Col. 10, lines 8-34]**.

Regarding claims 17 and 23, Narasimhan teaches the apparatus comprising a memory coupled to the processor and storing a predetermined number of previously determined noise estimates corresponding to the unassigned sub-carrier, the processor determining an average

noise estimate based in part on the noise estimate and the previously determined noise estimates **[Col. 7, lines 29-42, the soft-decisions are noise estimates which would have to be stored if you want to get geometric mean so the apparatus has to have memory coupled to processor, also see Col. 10, lines 8-34]**.

Regarding claims 18 and 24, Narasimhan teaches the wireless receiver comprises: an RF receiver portion configured to wirelessly receive RF OFDM symbols and convert the RF OFDM symbols to the OFDM symbols **[Fig. 1, 120]**; a Fast Fourier Transform (FFT) module configured to receive the OFDM symbols from the RF receiver portion and transform the OFDM symbols to modulated sub-carriers **[Fig. 2, 208]**; and a demodulator coupled to the FFT module and configured to demodulate the modulated sub-carriers **[Fig. 2, 220]**.

Regarding claims 19 and 25, Narasimhan teaches the detector detects the received power levels of an output of the demodulator **[Fig. 2, 235]**.

Regarding claim 21, Narasimhan teaches an apparatus for estimating noise in an Orthogonal Frequency Division Multiplexing (OFDM) system **[Fig. 2]**, the apparatus comprising: means for wirelessly receiving OFDM symbols corresponding to an OFDM symbol period **[Fig. 1 and 2, 120]**; means for detecting a received power level of signals received by the means for wirelessly receiving OFDM symbols during the OFDM symbol period **[Fig. 2, 210, 235]**; processing means, coupled to the means for detecting, for determining an unassigned sub-carrier during the OFDM symbol period and determining a noise estimate based in part on a received power level in a frequency band corresponding to the unassigned sub-carrier **[Fig. 4, 415, Col. 3, lines 31-48, determining SNR determines power of unassigned sub-carrier]**, and for determining an average noise estimate based in part on the noise estimate and a previously

stored noised estimate **[Col. 8, lines 17-47, averaging the power over the number of OFDM symbols and measuring signal quality and performing SNR estimate and averaging on a per symbol basis]**.

Regarding claim 27, Narasimhan teaches a computer-readable medium embodying a program of instructions executable by a processor to perform a method of estimating noise in an Orthogonal Frequency Division Multiplexing (OFDM) system **[Col. 10, lines 8-34]**, the method comprising: receiving OFDM symbols in a wireless cellular communication system, the OFDM symbols corresponding to a symbol period **[Abstract]**; determining an unassigned sub-carrier during the symbol period **[Col. 12, lines 20-26, where selecting one of the subsets will leave the other subset unassigned]**; determining a power, during the symbol period, of a signal in a frequency band corresponding to the unassigned sub-carrier **[Abstract, determining SNR determines power of unassigned sub-carrier]**; storing a value of the power of the signal in a memory; and averaging the power of the signal with previously stored values to generate a noise estimate **[Col. 8, lines 17-47, averaging the power over the number of OFDM symbols and measuring signal quality and performing SNR estimate and averaging on a per symbol basis]**.

Claim Rejections - 35 USC § 103

4. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Narasimhan (USPN 7,016,651) in view of Vella-Coleiro (USPN 7,197,085).

Regarding claim 9, Narasimhan teaches a method as discussed in rejection of claim 1.

However, Narasimhan does note teach determining a sum of a square of a quadrature signal component with a square of an in-phase signal component.

Vella-Coleiro teaches determining a sum of a square of a quadrature signal component with a square of an in-phase signal component **[Col. 4, lines 38-45]**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to determine a sum of a square of a quadrature signal component with a square of an in-phase signal component so that index value can be calculated **[Col. 4, lines 38-45]**.

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Narasimhan (USPN 7,016,651) in view of Jones et al. (USPN 6,757,241).

Regarding claim 10, Narasimhan teaches a method as discussed in rejection of claim 1.

However, Narasimhan does not teach determining if the unassigned sub-carrier frequency band comprises a system wide unassigned sub-carrier frequency band; storing the detected received power as a noise plus interference estimate if the sub-carrier frequency band does not comprise the system wide unassigned frequency band; and storing the detected received power as a noise floor estimate if the sub-carrier frequency band comprises the system wide unassigned frequency band.

Jones teaches determining if the unassigned sub-carrier frequency band comprises a system wide unassigned sub-carrier frequency band **[Col. 3, lines 35-38]**; storing the detected received power as a noise plus interference estimate if the sub-carrier frequency band does not comprise the system wide unassigned frequency band **[Col. 3, lines 49-55]**; and storing the detected received power as a noise floor estimate if the sub-carrier frequency band comprises the system wide unassigned frequency band **[Col. 4, lines 29-38]**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to store the detected receive power as a noise plus interference estimate if the sub-carrier frequency is being used and only storing noise if the sub-carrier frequency band is not used since in the absence of interference only noise is present **[Col. 4, lines 37-38]**.

6. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Narasimhan (USPN 7,016,651) in view of Jones et al. (USPN 6,757,241) as applied to claim 10 above, and further in view of Crawford (USPN 6,549,561).

Regarding claim 11, the references teach a method as discussed in rejection of claim 10.

However, the references do not teach synchronizing a time reference with a transmitter transmitting the OFDM symbols.

Crawford teaches synchronizing a time reference with a transmitter transmitting the OFDM symbols **[Col. 6, lines 1-3]**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to synchronize the time with a transmitter since its well known in the art that this information is included in the short symbol portion **[Col. 6, lines 1-3]**.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chandrahas Patel whose telephone number is (571)270-1211. The examiner can normally be reached on Monday through Thursday 7:30 to 17:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on 571-272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ricky Ngo/
Supervisory Patent Examiner, Art Unit 2616

/Chandrahas Patel/

Examiner, Art Unit 2616